

# A+ Guide to Managing & Maintaining Your PC, 8th Edition

## *Chapter 19*

### *Supporting Notebooks*

# Objectives

- Learn about special considerations when supporting notebooks that are different from supporting desktop computers
- Learn how to configure, optimize and troubleshoot slots, ports, and peripheral devices used with notebooks
- Learn how to replace and upgrade internal components in a notebook and all-in-one computer
- Learn how to troubleshoot hardware problems with notebooks

# Special Considerations When Supporting Notebooks

- Notebook (laptop): portable computer
  - Varieties: tablet PCs and netbooks
    - Tablet PC has more features than a notebook
    - Netbook is smaller and has less features than notebook
- Comparing notebooks to desktop computers
  - Use the same technology as desktops
  - Smaller, portable, and uses less power
  - Replacement parts cost more than desktops
- Notebooks offer a variety of ports and slots

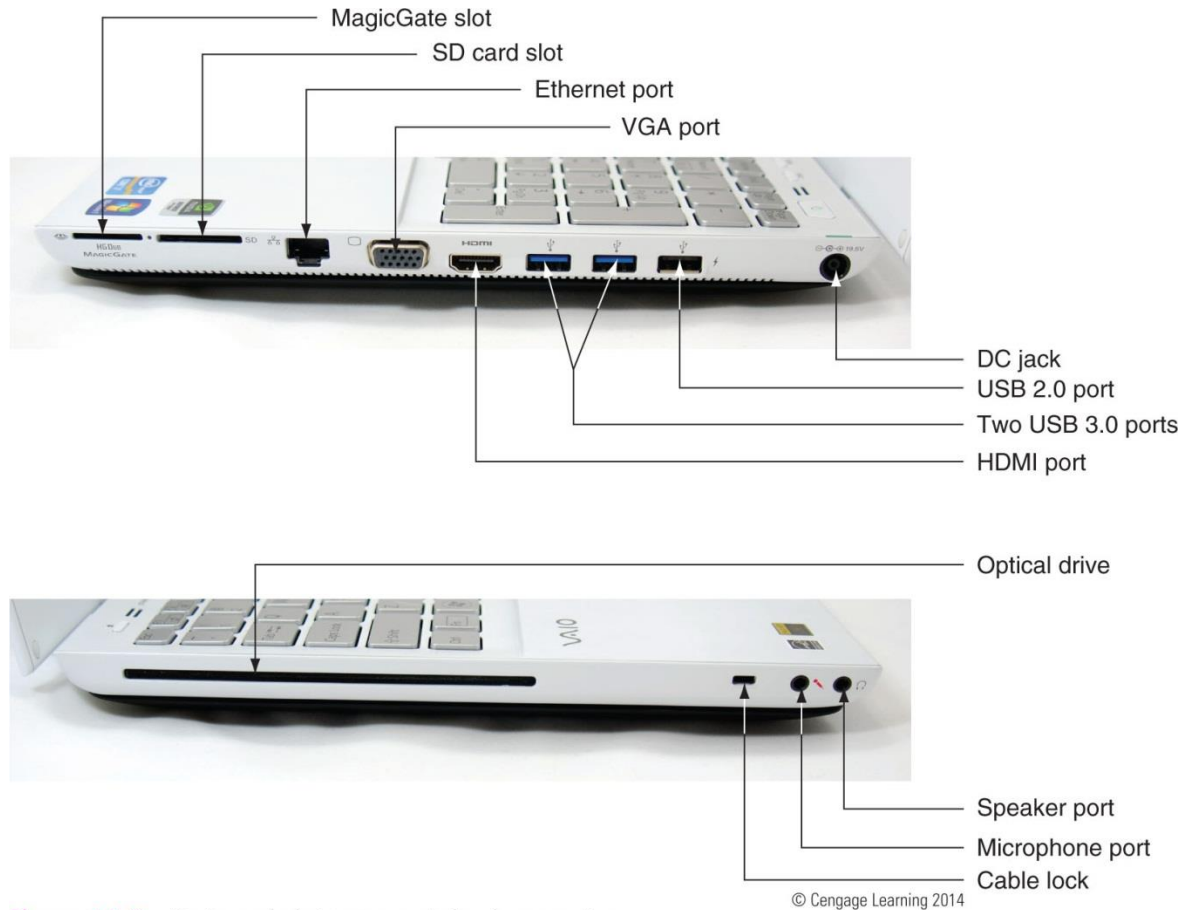
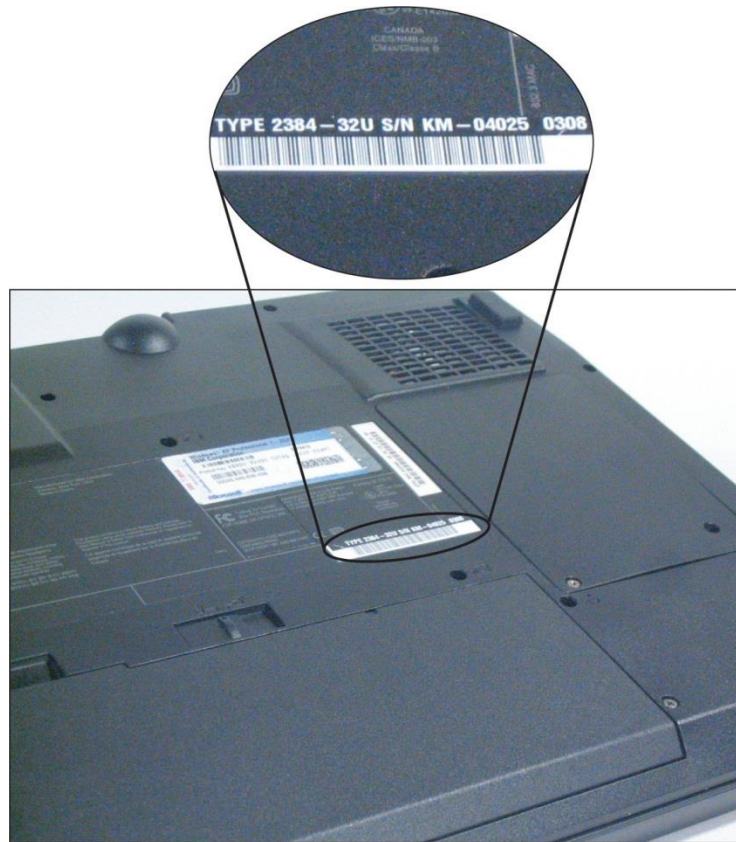


**Figure 11-2** Ports and slots on a notebook computer

## Figure 19-2 Ports and slots on a notebook computer

# Warranty Concerns

- Always check to see if notebook is under warranty before servicing
- Contacting technical support: information needed
  - Notebook model and serial number
  - Purchaser name, phone number, address
- Service options
  - On-site
  - Ship to authorized service center
  - Phone assistance or online chat



© Cengage Learning 2014

**Figure 19-4** The model and serial number stamped on the bottom of a notebook are used to identify the notebook to service desk personnel.

# Service Manuals and Other Sources of Information

- Service manuals save time
  - Enables safe notebook disassembly
- Locating documentation – Service manual
  - Manufacturer's physical manual
  - Manufacturer's Web site
    - Support or FAQ pages
  - Third party websites
- User manual
  - Provides basic maintenance tasks

# Diagnostic Tools Provided By Manufacturers

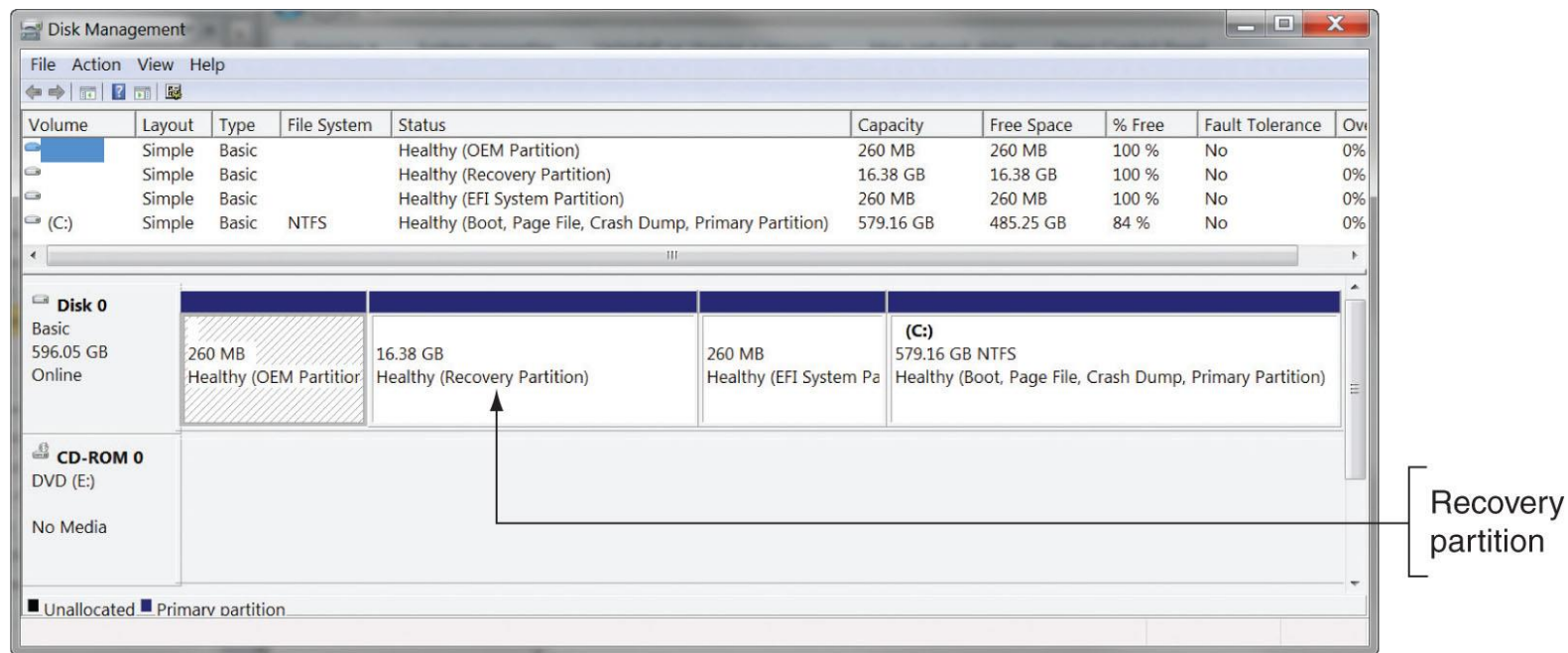
- To determine problem components use diagnostic software provided by manufacturer
  - Sources:
    - Manufacturer's Web site
    - CDs bundled with the notebook
    - Hard drive or floppy disk
  - Example: PC-Doctor
    - Included with Lenovo, Fujitsu, and HP notebooks
    - Can be purchased separately

# The OEM Operating System Build

- Operating system preinstalled at the factory
  - Original equipment manufacturer (OEM)
  - OS Build
    - Customized installation of the OS
  - Proprietary drivers
  - Customized diagnostic software
- Use caution when upgrading to new OS

# The OEM Operating System Build

- Recovery partition and recovery CDs
  - Hard drive recovery partition can contain OS
    - May be hidden
    - Files protected from access
    - See user manual for access
    - Can also use Disk Management utility in Windows
  - Recovery CDs came bundled with older notebooks
    - Provided by manufacturer
    - Drivers and application setup programs
    - Today's laptops provide a way to create recovery media before there is a problem



Source: Microsoft Windows 7

**Figure 19-8** This notebook hard drive has a recovery partition that can be used to recover the system.

# The OEM Operating System Build

- Operating system upgrades
  - Perform only if necessary
- Tips:
  - Upgrade using OS build from manufacturer
  - Ensure supporting device drivers included
  - Follow OEM's specific instructions
- Off-the-shelf OS advice:
  - Verify system component compatibility
  - Ensure device drivers available
  - Flash BIOS before upgrade, if necessary

# Maintaining Notebooks and Notebook Components

- General guidelines:
  - Do not touch LCD panel with sharp objects
  - Do not pick up or hold by the lid
  - Use OEM recommended battery packs
  - Do not tightly pack in a suitcase – use carrying case
  - Do not move while hard drive is being accessed
  - Do not put close to appliances generating strong magnetic field
  - Do not connect to the Internet using a public network without setting the network location to Public

# Maintaining Notebooks and Notebook Components

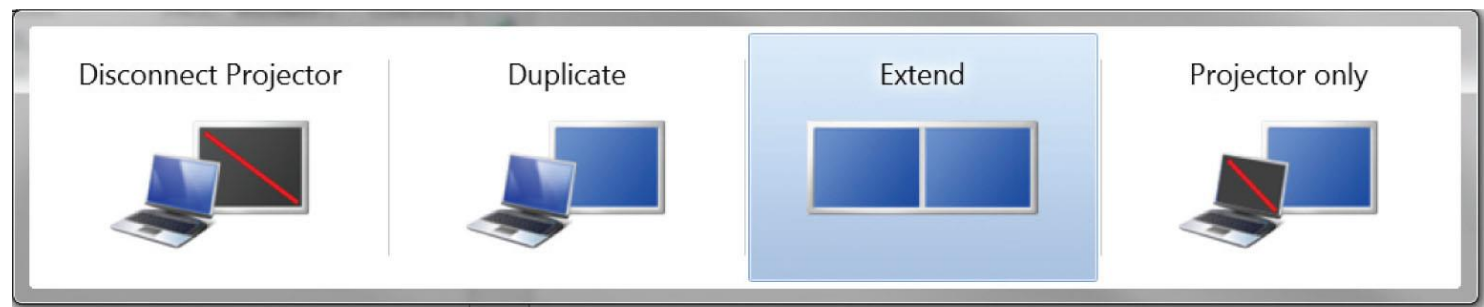
- General guidelines: (cont'd.)
  - Use passwords with each Windows user account
  - Keep notebook at room temperature
  - Keep OS current
  - Keep away from smoke, water, dust
  - Do not power up and down unnecessarily
  - Do not run it while it is in the case, resting on pillow or covered by a blanket
  - Protect notebook against ESD
  - Remove CD/DVD before traveling
  - Take precautions if notebook gets wet

# Maintaining Notebooks and Notebook Components

- Cleaning tips:
  - Clean LCD panel with a soft dry cloth
  - Use compressed air
    - To clean keyboard, track ball, and touch pad
    - To blow out air vents
    - Remove keyboard if keys are sticking and then blow air under keys
  - Use contact cleaner
    - Battery connections

# Special Keys, Buttons, and Input Devices on a Notebook

- Button or switches might be above the keyboard
  - Most of the same settings that these buttons control may also be changed using Windows tools
- Some settings might be:
  - Volume
  - Screen brightness
  - Dual displays
  - Bluetooth or Wi-Fi



Source: Microsoft Windows 7

**Figure 19-12** Control dual monitors on a laptop

# Special Keys, Buttons, and Input Devices on a Notebook

- Common laptop pointing devices
  - Touch pad, TrackPoint or point stick
  - Some prefer USB wired or wireless mouse



© Cengage Learning 2014

**Figure 19-13** The touch pad is the most common pointing device on a notebook

# Special Keys, Buttons, and Input Devices on a Notebook

- Adjust touch pad or TrackPoint
  - Mouse Properties box:
    - Adjust pointer speed, mouse trails, pointer size, how the touch pad buttons work, other settings for pointing devices
- Tablet PCs
  - Stylus controlled from the Pen and Input Devices box
    - Accessed from Windows Control Panel

# PCMCIA and ExpressCard Slots

- Most peripheral devices today use a USB port to connect to a notebook
- Older notebooks offered slots to connect peripherals
  - Personal Computer Memory Card International Association (PCMCIA)
  - Include variations of PC Card, CardBus, ExpressCard
- PC Card slot technologies
  - 16-bit ISA bus
  - Three standards pertaining to size and thickness
    - Type 1, Type II, Type III

# PCMCIA and ExpressCard Slots

- CardBus
  - Increases bus width to 32 bits
  - Backward compatible with earlier standards
- ExpressCard matches PCI Express and USB 2.0
  - Two sizes: ExpressCard/34 and ExpressCard/54
  - Not backward compatible
  - Hot-pluggable, hot-swappable, and supports autoconfiguration

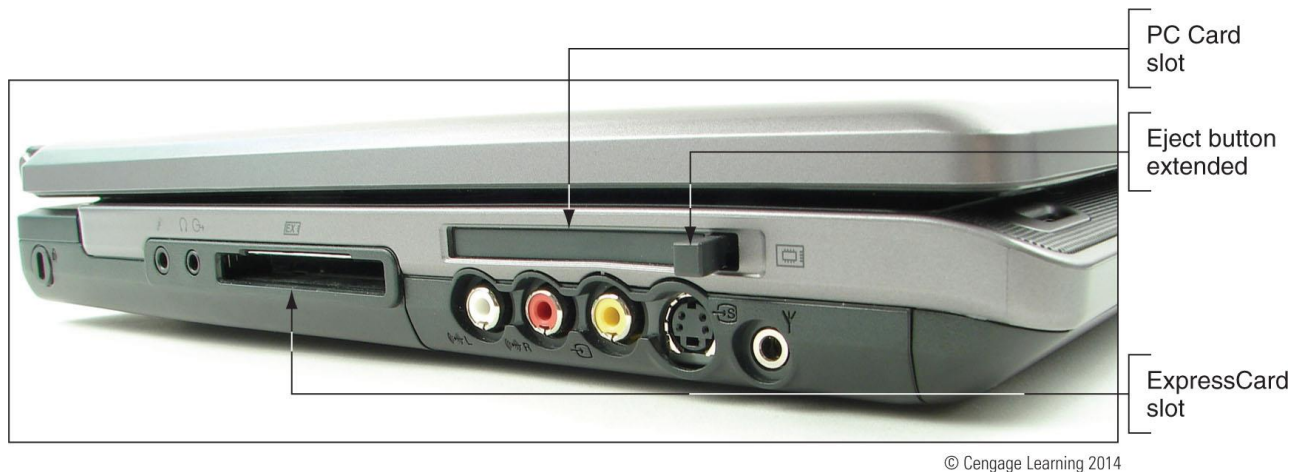


**Figure 19-18** This notebook has one CardBus slot and one ExpressCard slot

# PCMCIA and ExpressCard Slots

- Windows services for PC Card or ExpressCard
  - Socket service and card service
- Removing card from PC card or ExpressCard slot
  - Use the Safely Remove Hardware icon in the notification area
  - Proceed to eject the card

# Updating Port or Slot Drivers

- If problems arise with a port or slot:
  - Use Device Manager to see if errors are reported
- Backups of drivers may be stored on hard drive
  - Download the latest drivers from manufacturer's web site
- If problem is not solved by updating drivers:
  - Use Device Manager to uninstall the port or slot drivers
  - Then use support tools to reinstall the drivers

# Power and Electrical Devices

- Notebook power sources
  - AC adapter or a battery pack
- Auto-switching AC adapter feature
  - Device automatically switches from 110 V to 220 V AC power
- Today's batteries use:
  - Lithium Ion Technology
- Some notebooks use two batteries
  - Second battery is known as a sheet battery

# Power and Electrical Devices

- Notebook power needs
  - A DC adapter for travel
    - Inverter changes DC to AC



© Cengage Learning 2014

**Figure 19-26** An inverter changes DC to AC and provides an outlet for your laptop's AC adapter

# Power Management

- Use power management settings to conserve power
- Power-saving states
  - Sleep mode: also called suspend mode
    - Saves power when computer is not in use
  - Hibernation: work is saved to hard drive and powers system down
- Older computers allows power settings to be configured in Windows and in BIOS setup
  - Newer BIOS does not control power settings that might conflict with Windows settings

# Power Management

- Using the Advanced Configuration and Power Interface (ACPI) standards, BIOS might refer to 5 S states:
  - S1: hard drive and monitor are turned off, everything else runs normally
  - S2: processor is also turned off
  - S3: everything is shut down except RAM and enough of the system to respond to a wake-up (sleep mode)
  - S4: hibernation
  - S5: power off state after a normal shutdown

# Port Replicators and Docking Stations

- Port replicator
  - Easy connection to full-sized monitor, keyboard, AC power adapter, and other devices
- Docking station
  - Same functions as port replicator
  - Additional slots for adding secondary storage devices and expansion cards

# Replacing and Upgrading Internal Parts

- Topics:
  - Alternatives to consider before taking on complex repair projects
  - How to upgrade memory
  - How to exchange a drive
  - How to perform other complex repair projects
    - Exchanging an LCD panel or motherboard

# Three Approaches to Dealing with a Broken Internal Device

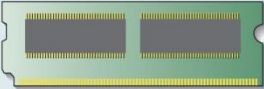
- Factors to consider before starting repair project:
  - Warranty
  - Time the repair will take
  - Alternatives to fixing (upgrading)
    - Return notebook to manufacturer or service center
    - Substitute external component for internal device
    - Replace the internal device

# Three Approaches to Dealing with a Broken Internal Device

- Before replacing or upgrading a component:
  - Back up important data if possible
  - Ground yourself against ESD
  - Remove ExpressCards, CDs, DVDs, flash memory cards, or USB devices and then shut down notebook
  - Disconnect AC adapter
  - Undock (if necessary) and remove the battery

# Upgrading Memory

- Memory used in notebooks
  - SO-DIMMs (small outline DIMMs)
    - DDR3 or DDR2
  - SO-RIMMs (small outline RIMMs) – used by older notebooks
- Can only use the type of memory the notebook is designed to support

| Memory Module Description                                                                                                                 | Sample Memory Module                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 2.66" 204-pin SO-DIMM contains DDR3 memory. The one notch on the module is offset from the center of the module.                          |  <p>Courtesy of Kingston Technology Corporation</p> |
| 2.66" 200-pin SO-DIMM contains DDR2 SDRAM. One notch is near the side of the module.                                                      |  <p>Courtesy of Kingston Technology Corporation</p> |
| 2.66" 200-pin SO-DIMM contains DDR SDRAM. One notch near the side of the module is slightly offset from the notch on a DDR2 SDRAM module. |  <p>Courtesy of Micron Consumer Products</p>        |
| 2.66" 144-pin SO-DIMM contains SDRAM. One notch is slightly offset from the center of the module.                                         |  <p>Courtesy of Micron Consumer Products</p>        |
| 2.35" 72-pin SO-DIMMs contain FPM or EDO memory and have no notch on the edge connector.                                                  |  <p>© Cengage Learning 2014</p>                     |
| 160-pin SO-RIMM contains Rambus memory and has two notches.                                                                               |  <p>Courtesy of High Connection Density, Inc.</p>  |

© Cengage Learning 2014

**Table 11-2** Memory modules used in notebook computers

# Upgrading Memory

- How to upgrade notebook memory:
  - Upgrade process is similar to desktops
  - Considerations:
    - Make sure warranty not being voided
    - Search for best buy on a suitable and authorized part
  - General steps:
    - Decide how much memory to upgrade
    - Purchase memory
    - Install it
  - Follow steps outlined in the chapter

# Replacing a Hard Drive

- General guidelines:
  - See manufacturer's documentation for drive sizes and connector types
  - Be aware of voiding manufacturer's warranty
- Shopping:
  - Notebook drive: 2.5 inches wide
    - May use SSD (solid state device) technology
  - Hard drives connector: SATA or PATA (IDE)
  - 44-pin IDE drive may use adapter to interface between proprietary connector and motherboard

# Replacing a Hard Drive

- Issues to consider before replacing hard drive:
  - Old drive crashed
    - Recovery media and notebook drivers CD required
  - Upgrade: must transfer data from old drive to new one
- Older notebook computers required disassembly
- Newer notebooks: easy to replace
  - If BIOS setup uses autodetect:
    - System boots up and BIOS recognizes new drive
    - Searches for an operating system
    - If a new drive: boot from Windows recovery CD



© Cengage Learning 2014

**Figure 19-40** This one screw holds the hard drive in position

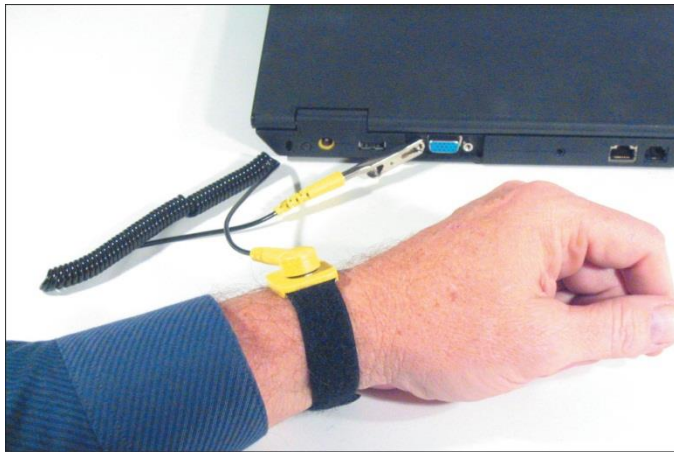


© Cengage Learning 2014

**Figure 19-41** Push the drive out of its bay

# Disassembling and Reassembling a Notebook Computer

- Requires special tools and extra patience



© Cengage Learning 2014

**Figure 19-43** To protect the system against ESD, attach the alligator clip of a ground strap to an I/O port on the back of the notebook.

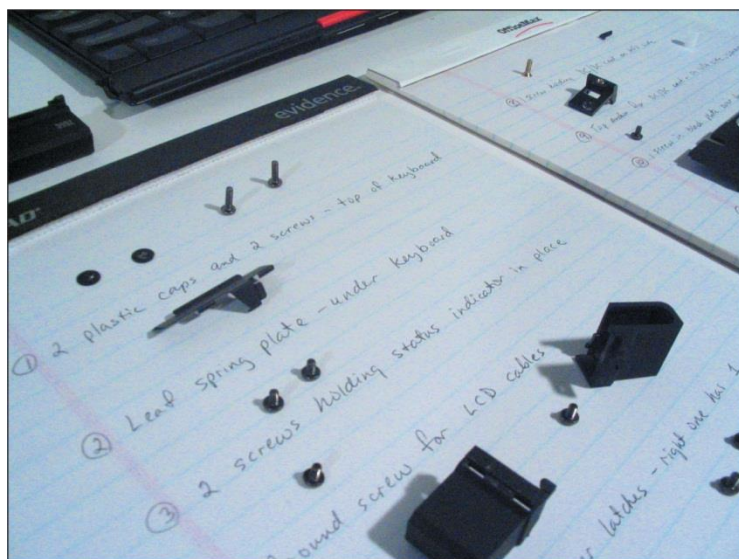


© Cengage Learning 2014

**Figure 19-44** Tools for disassembling a notebook computer.

# Disassembling and Reassembling a Notebook Computer

- Many small screws require smaller tools
- Work methodically:
  - Keep screws and components organized
    - Place screws in a pillbox (label each compartment)
    - Place screws on soft padded work surface
      - Use white labeling tape
    - Place screws on notebook paper
      - Write where screw belongs
    - Tape screw beside manufacturer documentation
  - Keep notes to help with reassembly



© Cengage Learning 2014

**Figure 19-46** Using a notepad can help you organize screws so you know which screw goes where when reassembling



© Cengage Learning 2014

**Figure 19-47** Tape screws beside the step in the manufacturer documentation that told you to remove the screw.

# Disassembling and Reassembling a Notebook Computer

- Disassembly tips:
  - Find the hardware service manual
  - Consider the warranty might still apply
    - Opening the case might void the warranty
  - Take the time necessary, do not force anything
  - Protect against ESD
  - Understand ZIF connectors
  - Pry up plastic covers with dental pick or screwdriver
  - Plastic screws may be used only once
  - Disassemble components in order

# Disassembling and Reassembling a Notebook Computer

- Reassembly tips:
  - Reassemble notebook in reverse order
  - Tighten, but do not over tighten, all screws
  - Before installing the battery or AC adapter verify there are no loose parts inside the notebook

# Disassembling and Reassembling a Notebook Computer

- Replacing the keyboard and touchpad:
  - Power down and unplug notebook
  - Remove screws on notebook bottom
  - Open Lid
    - Push keyboard toward lid while pulling it up to release it from the case
  - Bring keyboard out of the case and forward
    - Expose keyboard ribbon cable
    - Use screwdriver to lift cable connector up and out
  - Replace keyboard following steps in reverse order
  - If touchpad is part of keyboard bezel, remove keyboard before removing the keyboard bezel

# Disassembling and Reassembling a Notebook Computer

- Replacing optical drives:
  - Remove keyboard
  - Remove screw holding DVD drive to notebook
  - Slide drive out of the bay and new drive into the bay
    - Ensure connection with drive connector
    - Replace the screw
- Replacing expansion cards:
  - Newer notebook use Mini PCI Express slots (Mini PCIe)
    - Uses 52 pins on the edge connector
  - Older notebooks use a Mini PCI slot

# Disassembling and Reassembling a Notebook Computer

- Steps to remove a Mini PCIe wireless network card:
  - Disconnect antenna from Wi-Fi card
  - Remove the one screw at the top of the card
  - Pull card forward and out of the slot

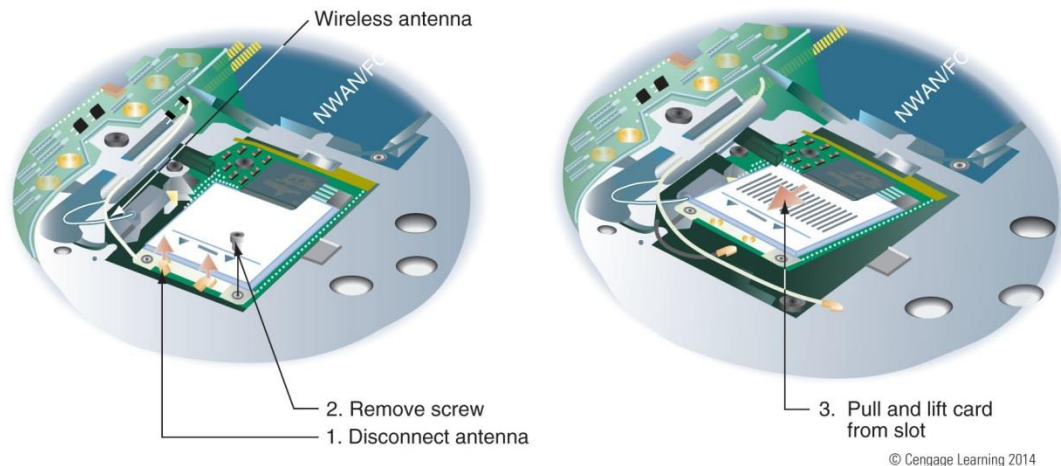
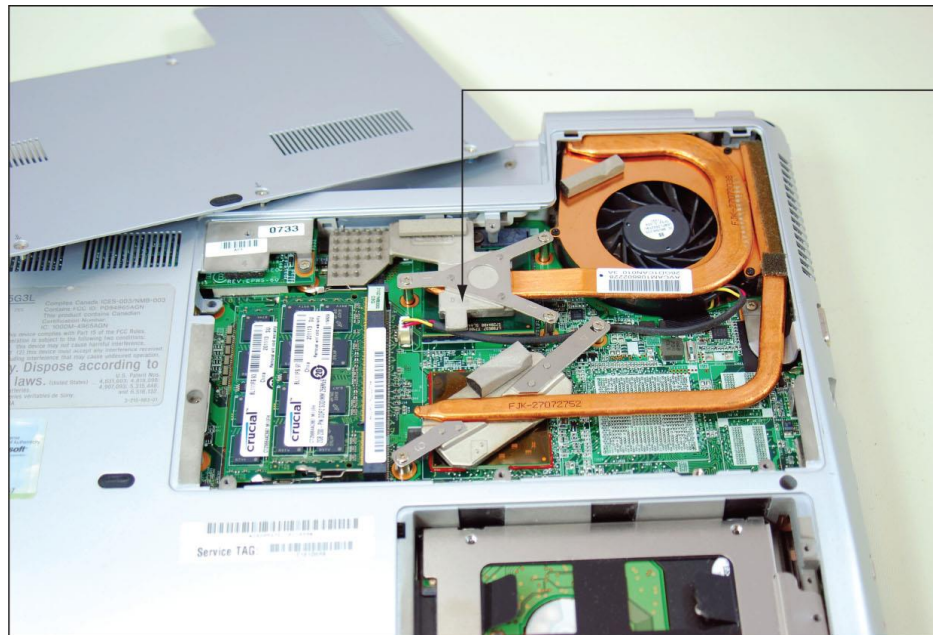


**Figure 19-61** How to remove a Mini PCI Express card

# Disassembling and Reassembling a Notebook Computer

- Replacing the processor:
  - Use CPU supported by manufacturer and notebook model
  - For many laptops, remove the cover on the bottom to expose the processor fan and heat sink assembly
  - Some laptops may require you to remove the keyboard and keyboard bezel to reach the fan assembly and processor



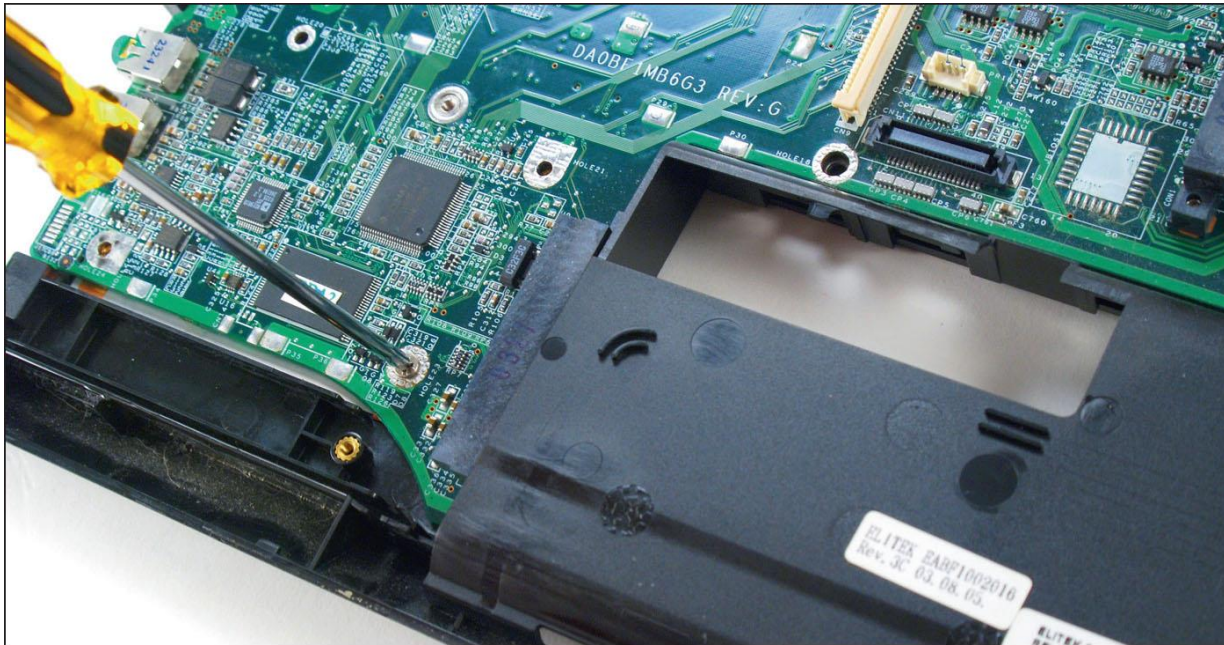
Processor socket  
is under this  
portion of the  
heat sink

© Cengage Learning 2014

**Figure 19-63** Remove the cover from the bottom of the laptop to expose the heat sink and fan assembly and to reach the processor

# Disassembling and Reassembling a Notebook Computer

- Replacing the motherboard:
  - Need to fully disassemble the entire notebook
    - Consider alternatives before proceeding
  - General procedure for replacing the motherboard:
    - Remove the keyboard, optical drive, and mini PCIe card
    - Remove the notebook lid and keyboard bezel assembly
    - Lift up the assembly and disconnect two cables connecting it to the motherboard
    - Remove CPU and DVD drive
    - Remove screw that hold motherboard in place



© Cengage Learning 2014

**Figure 19-71** Remove the single screw attaching the motherboard to the case

# Disassembling and Reassembling a Notebook Computer

- Replacing the LCD panel:
  - If LCD panel is dim or black:
    - Connect external monitor to video port
  - Toggle between LCD panel, external monitor, and both the panel and monitor
    - If external monitor works: LCD panel assembly likely broken
    - If LCD display entirely black: replace LCD assembly
    - If LCD display dim: video inverter problem
  - High-end notebooks contain video card
    - May need to replace it too

# Disassembling and Reassembling a Notebook Computer

- General directions to replace an LCD panel:
  - Remove AC adapter and battery pack
  - Remove the keyboard
  - Remove screws holding hinge in place
    - Remove hinge cover
  - Remove screws holding LCD panel to the notebook
  - Remove LCD panel from the notebook
  - Remove screws holding the top cover and LCD panel
  - Disconnect old inverter and install the new one
  - Reattach LCD panel assembly to the notebook

# Working Inside An All-In-One Computer

- All-in-one computer: uses a mix of components sized for a desktop and a notebook
  - For some components, you'll need to buy replacements from the manufacturer because they are most likely proprietary
  - See the service manual for specific directions about replacing parts

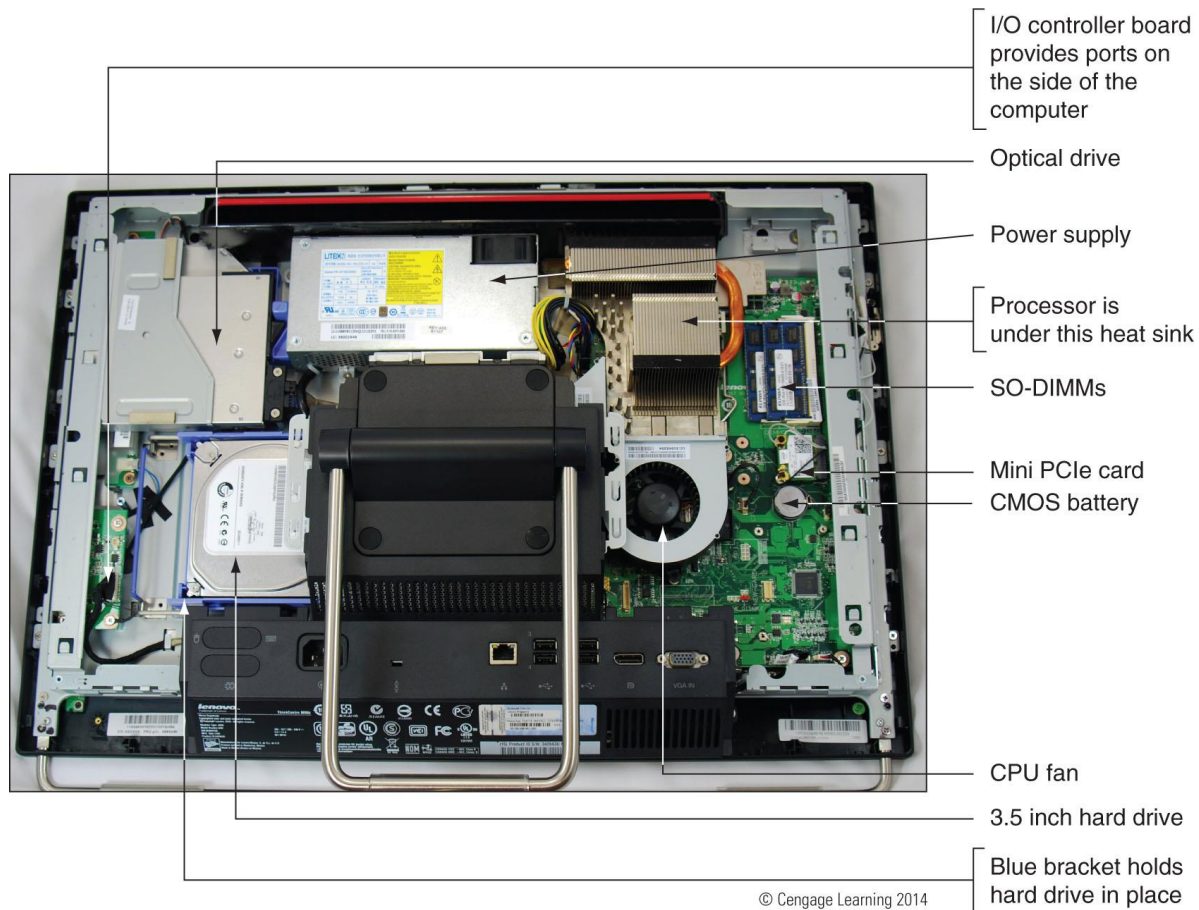


**Figure 19-80** Components inside an all-in-one computer

# Troubleshooting Notebooks

- Use diagnostics software to troubleshoot problems with notebook ports, slots or other devices
  - Download from manufacturer's web site if you don't have it available on the hard drive
- Next few slides cover some common problems with notebooks and how to solve them

# Problems Logging Onto Windows

- Check to make sure NumLock is off
  - Notebooks use this key to toggle between keys interpreted as letters and numbers
  - Most notebooks have a NumLock indicator light near the keyboard

# No Wireless Connectivity

- Notebook might have a switch to turn internal wireless adapter on and off
  - Might also use a key combination for that purpose
  - Ensure switch is set to on
- For intermittent connectivity, ensure laptop is within range of wireless access point
- Follow directions for your notebook to turn Bluetooth on

# Power or Battery Problems

- If power is not getting to the system or battery indicator light is lit:
  - Verify the AC adapter is plugged into an outlet
  - Check if AC adapter's plug is secure outlet
  - Check connections on both sides of AC adapter transformer
  - Check connection at notebook
- If battery is not charging when AC adapter is plugged in, problem might be with battery or motherboard

# No Display

- If LCD panel shows a black screen but power light is on:
  - Look for an LCD cutoff switch or button on laptop
  - Try to use the video port on the notebook to connect to an external monitor
  - If external monitor does work, problem is with the LCD panel assembly
    - Will need to replace inverter or LCD panel

# Flickering, Dim, or Otherwise Poor Video

- Tips to solve problems with bad video:
  - Verify Windows display settings
  - Adjust the brightness
  - Update the video drivers
  - A flickering screen can be caused by bad video drivers, a low refresh rate, a bad inverter, or loose connections inside the laptop

# Summary

- Notebook computers are designed for travel
- The notebook manufacturer documentation are useful when disassembling, troubleshooting, and repairing a notebook
- A notebook uses a customized installation of the Windows OS, customized by the manufacturer
- A notebook hard drive is likely to contain a recovery partition or notebook may come with recovery CDs
- PC Cards, CardBus, and ExpressCard slots are a popular way to add peripheral devices to notebooks

# Summary

- Updating drivers for a port or slot can sometimes solve problems
- A notebook can be powered by a battery pack or AC adapter connected to a power source
- Windows 7/Vista uses sleep mode and hibernation to conserve power
- When an internal component needs replacing, consider disabling the component and using an external peripheral device in its place
- Current notebooks use SO-DIMMs for memory

# Summary

- When upgrading components on a notebook, use components that are the same brand as notebook
- Use diagnostics software from the notebook manufacturer to troubleshoot
- Use a multimeter to check the voltage output of an AC adapter
- Use an external monitor to verify that a video problem is with the LCD panel rather than internal video card or motherboard